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POLLUTION CONTROL: CAN PAST LESSONS BE RECYCLED?

Summary

Japan's approach to pollution control contains some surprising anomalies. In a nation renowned for being nonlitigious, the court system initially played a dominant role in helping victims of pollution. And, while industry typically wears a black hat in most countries in terms of environmental degradation, corporate-government cooperation in Japan has been effective in responding to some pollution problems that have relied on a technical component but less so for others.

As Japan dons the accoutrements of advanced industrialization, its populace is shedding some of its conservatism in the use of natural resources. This may complicate the application of the lessons learned from coping with past air, land and water pollution problems. However, growing environmental awareness, technological breakthroughs and pressure to improve pollution abatement types of public infrastructure may provide the necessary stimulus.

Compensation Law Establishes Precedent

The Pieta-like picture of a mother bathing the wasted body of a family member drew worldwide sympathies in the 1970s and cast in infamy the corporation accused of dumping methyl mercury into the sea near Minamata, the name that would be linked to the mercury poisoning disease. Although Chisso Corp. tried vainly to deny its complicity as well as to threaten victims into silence, sufferers of Minamata disease eventually had their day in court. That day, however, was not vindicated by a judicial decision until 1973, more than

15 years after the disease first was defined. By then legislation passed by the 1970 "Pollution Diet" to strengthen earlier laws had begun to take effect, decreasing air and water contamination.

The Minamata court case was one of four in the early 1970s that helped shape the pollution-related Health Damage Compensation Law, which has been described as a law that was "created as a quicker and more efficient substitute for litigation, similar, for example, to the no-fault automobile accident insurance systems [in the United States]. . . ."[1] The other court decisions that helped shape the 1973 compensation law included similar mercury poisonings in the Niigata area, a cadmium-related contamination that led to the descriptively named "Itai-itai" or "Ouch, ouch" disease and a dispute in which 12 sufferers of asthma blamed six firms in the Yokkaichi area of Mie prefecture for contributing to air pollution that caused their respiratory problems.

The 1973 compensation law, which strengthened a 1969 measure, added weight to the enforcement of a tough air pollution law passed in 1968 and a less stringent water pollution law, which has been reinforced at frequent intervals since the original law was passed in 1958 to control effluents and improve water quality. Although it was revised in 1988, the 1973 compensation law originally allowed compensation to two categories of pollution-related victims: those living in Class 1 areas, in which the population was found to have above-average rates of respiratory problems, and those in Class 2 areas, which were connected to one of three specific diseases: mercury poisoning such as that found in Kumamoto and Niigata prefectures; cadmium poisoning, including, for example, that linked with Itai-itai disease in Toyama prefecture; and arsenic poisoning, tied to pollution in Miyazaki and Shimane prefectures.

Respiratory sufferers living in or commuting to an area ranked Class 1 for air pollution could receive compensation from a fund created from levies against area firms that polluted from stationary sources. These levies made up 80 percent of the fund, while a tax on motor vehicles supplied the remaining 20 percent in recognition of emissions from that source. This aspect of the law stemmed primarily from the Yokkaichi court case. Based on initial court rulings, those suffering from mercury poisoning were to work out compensation schemes directly with Chisso and Showa Denko K.K., the company found culpable in the Niigata poisonings. A public corporation continues to collect and administer the compensation monies for pollution victims who have been certified as eligible for compensation by panels that include medical experts.

Problems with the Law - Emotion may have had a greater hand than scientific evidence in helping win passage of the 1973 compensation legislation. But the lack of a solid scientific connection between respiratory problems in certain areas and specific emissions has been cited as one of the reasons that the

[1]Bruce Aronson, "Legal and Policy Issues in the Japanese Compensation Law" in Tsukasa Namekata and Charles du V Florey (eds.), Health Effects of Air Pollution and the Japanese Compensation Law (Columbus, Ohio: Battelle Press, 1987), p. 146.

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Class 1 designation was dropped from the compensation law in March 1988. Although all those who formerly received compensation under the Class 1 section of the law continue to benefit, no new cases are being recognized.

In criticizing the scientific basis of the 1973 law epidemiologist Tsukasa Namekata noted at a 1984 workshop on issues in air pollution, "Current air pollution levels in both Class 1 and non-Class 1 regions [in Japan] are so low that, using epidemiologic techniques currently available, no effects can be detected although they might exist."[2] The Battelle Memorial Institute scientist criticized the studies used to determine if there were an above-average number of persons with pollution-related respiratory ailments in the area; among the failures, he said, was not taking into account whether surveyed households also contained smokers. Moreover, even if a Class 1 area's air pollution contributed to respiratory distress, the law did not allow compensation for those who suffered complications from associated illnesses, such as heart disease, Mr. Namekata noted.[3] He also pointed to the lopsided application of the law. Only 2.3 percent of the recipients reviewed in a December 1983 report by the Environment Agency suffered from acute poisoning diseases; the remaining beneficiaries all had respiratory illnesses.

Another controversy over the 1973 compensation law has developed because the government has certified less than one-fourth of those who have applied for compensation based on claims that they suffer from Minamata disease. By the end of last September 12,929 persons had applied to the government to be certified as official victims of mercury poisoning; however, only 2,925 had been declared eligible for the compensation of Y24 million ($177,800 at Y135=$1.00). Late last year the Environment Agency, which has a separate compensation fund for those physically impaired by pollution, included about Y188 million ($1.4 million) in its FY 1991 budget request to cover the health-care costs of those not officially determined to be Minamata victims.

Since FY 1974 the agency has helped with medical expenses under the auspices of medical research for those applicants whose certification has not yet been approved. Additional help has been made available since June 1986 to those rejected for certification provided they exhibit symptoms of Minamata disease. An indication of the continuing sensitivity of the issue came from the linkage in the Japanese press of the December suicide of an Environment Agency official to the pressures he faced from dealing with those who claimed compensation for Minamata disease and the government's October 1990 decision to reject court recommendations that these claims be settled out of court.[4]

[2]Tsukasa Namekata, "Epidemiological Issues on Air Pollution in the Japanese Pollution-Related Health Damage Compensation Law" in Tsukasa Namekata and Charles du V Florey (eds.), Health Effects of Air Pollution and the Japanese Compensation Law (Columbus, Ohio: Battelle Press, 1987), p. 64.

[3]Telephone conversation with Tsukasa Namekata, research scientist at Battelle Memorial Institute's Human Affairs Research Center, Seattle, Washington, February 26, 1991.

[4]Vibeke Laroi, "Official's suicide is called a Minamata tragedy: Legal wrangle blamed," Japan Times, January 5, 1991, p. 2.

Even though Class 1 areas no longer are designated, the financing mechanism for the compensation fund remains intact; the portion previously tied to air pollution now supplies 80 percent of a Y50 billion ($370.4 million) fund to which the central government and companies associated with air pollution prevention contribute the remaining 20 percent. Projects that the Environment Agency singled out for receiving benefits from the fund in fiscal 1988 included asthma treatment and prevention assistance, promotion of battery-operated or methanol-fueled vehicles and increased planting of trees and construction of swimming pools.

A Mixed Legacy - Although now altered, the compensation law helped focus attention on pollution and the responsibility of firms to compensate victims whose health has been compromised by industrial activities. While Japanese firms are known to pay compensation to accident victims -- as in the case of airline crashes -- without the necessity of court cases, the compensation law was considered unique for the ease with which respiratory sufferers, particularly, could file claims and the scope of coverage, which included not just medical bills but loss of earning capacity as well.[5]

Were an individual or group to take compensation claims to court another law still benefits plaintiffs with pollution-related health complaints; it provides that negligence need not be proved, a more lenient standard than most tort law in Japan. In practice, though, the legal system still poses hurdles for those seeking compensation for environmental damages, as evidenced by the difficulties faced by Minamata sufferers. Moreover, with the cancellation of Class 1 designation for air pollution areas, all Japanese pollution cases fall back into the ranks of those that require "fault-based" litigation.

Even though companies face public censure for causing health problems and a levy on their pollution under the compensation statute, the inherent anti-industrial bias of this legislation appears to have been limited, judging by the response of local and central governments. The Environment Agency and the Kumamoto prefectural government, for example, have extended support to Chisso to help stabilize the region's economy. In addition, the central government urged financial institutions to support the company, while local officials agreed to allow the proceeds of special prefectural bond issues to be loaned to Chisso.

Monitoring and Cooperation a Key to Success

Fundamentally important to determining polluting culprits, particularly for air pollution, is Japan's monitoring system, where a cooperative approach between government and business is evident in the regulatory process. Throughout Japan large companies telemeter a constant flow of data from smokestack monitors to prefectural or municipal monitoring stations. Smaller companies are checked by areawide monitoring stations. If a certain plant or a region threatens to create an environmental emergency, government officials call plant operators and seek a reduction in emissions, either through a different fuel blend, a cutback in production or other alternatives. Periodic cross-checks of input-output data and monitored readings help make sure companies are not cheating.

[5]Aronson, op. cit., p. 148.

While companies can be fined and chief executive officers even can be jailed for failure to comply with regulations, administrative guidance appears to be successful in keeping emissions within the standards, considered some of the strictest in the world (see Tables 1 and 2). Compliance rates above 90 percent for sulfur dioxide emissions, for example, were among the reasons cited for doing away with Class 1 designations for air pollution areas. These emissions dropped from a high of 0.059 parts per million in 1967 to well within the standards, which have been periodically revised since 1968 and now are set at 0.04 ppm as a daily average. Regulations that required application of the best available technology -- which led to extensive use of desulferization and denitrification equipment -- also helped decrease sulfur and nitrogen dioxide emissions throughout Japan. Government officials lately have been concerned, however, about an upward swing in nitrogen oxide levels. This increase has been blamed on the growing number of cars on the road and not stationary, industrial emissions.

Similar success through regulation, monitoring and administrative guidance has been achieved in decreasing water pollution caused by the toxic substances named in the 1970 Water Pollution Control Law: cadmium, cyanide, organic phosphorus, mercury and alkyl mercury compounds, some types of chrome, arsenic, lead and PCBs (polychlorinated biphenyls). The latest available Environment Agency survey on water quality in public water areas indicated that in FY 1987 about 0.02 percent of the samples exceeded the standards for the listed toxics. Some problems continue, however, in areas previously contaminated by mercury and PCBs, where cleanup efforts have been slow.

Discoveries in the 1980s of increased contamination of groundwater by trichloroethylene and tetrachloroethylene resulted in the Water Pollution Control Law being amended in 1989 to include these substances (see below). Thus, while Japan has made advances in air and water pollution that can be monitored closely, problems still arise in stemming pollution at a more individual level as well as in situations where monitoring has not been put into place.

Regulating Moving, Diffused Targets

As local and central government officials have moved from attacking easily targeted stationary pollution sources to more general pollution concerns, such as the solid and liquid wastes generated by households, problems have arisen in both organizing the attackers and defining the target. Solid waste regulations, for example, involve the Ministry of Health and Welfare, the Environment Agency and the Ministry of International Trade and Industry. All three have proposed legislation to counter the burgeoning waste problem, with MHW seeking to amend old laws and the other two proposing new statutes.

The 1971 passage of the Waste Disposal and Public Cleansing Law divided waste disposal responsibilities into those handled by municipalities and those managed in-house by industry. Toxic substances were to be buried only at specific, well-contained sites built to withstand earthquakes, rainwater incursion or corrosion. Approximately 39 such sites have been licensed in Japan. The other two types of disposal areas, those that control leachate and those that do not, number 1,080 and 1,181, respectively. The leachate facilities include treatment areas as well as lined landfills that also are designed to withstand earthquakes and flooding. Plastics, concrete blocks, glass and other items that

Table 1: International Comparison of Emissions of Sulfuric Oxides and Nitrogen Oxides

	Year	SO_x	NO_x	Population	GDP	SO_x/ Population	NO_x/ Population	SO_x/ GDP	NO_x/ GDP
Japan	1986	835	1,176	121,490	$1,206	6.87	9.68	0.69	0.98
United States	1986	21,200	19,300	241,613	4,086	87.74	79.87	5.19	4.72
West Germany	1986	2,223	2,969	61,066	636	36.40	48.62	3.50	4.67
Great Britain	1987	3,867	2,303	56,930	484	67.93	40.45	7.99	4.76
France	1987	1,517	1,652	55,630	545	27.27	29.70	2.78	3.03

Note: Emissions in kilotons. Population in thousands. GDP in billions of dollars converted at 1985 exchange rates.

Source: Organization for Economic Cooperation and Development, Environmental Data 1989.

Table 2: Japanese Standards for Air Quality and Compliance, FY 1968-FY 1988

	Standard	FY 1968	FY 1970	FY 1972	FY 1974	FY 1976	FY 1978	FY 1980	FY 1982	FY 1984	FY 1986	FY 1988
Sulfur Dioxide	0.1 ppm* 0.04 ppm**	0.055	0.043	0.031	0.024	0.020	0.017	0.016	0.013	0.012	0.010	0.010
Nitrogen Dioxide	0.04-0.06 ppm***	n.a.	0.022	0.20	0.027	0.027	0.028	0.027	0.025	0.025	0.026	0.028
Suspended Particulate Matter	0.02 mg/m3* 0.10 mg/m3**	n.a.	n.a.	n.a.	0.059	0.050	0.048	0.043	0.041	0.041	0.041	0.039
Carbon Monoxide	20 ppm average in 8 hours 10 ppm daily average	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ozone	0.06 ppm (1-hour value)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

*Hourly values.
**Daily averages.
***On a yearly average Japanese standards correspond to 0.02-0.03 parts per million.

Note: Monitoring of sulfur dioxide and nitrogen dioxide was carried out at 15 general stations in continuous operation. Monitoring of suspended particulate matter was handled at 40 general stations in continuous operation. Annual averages are derived from the sum of all one-hour values in the year divided by total measured hours.

Source: Environment Agency

pose no direct health risk are allowed to be dumped at the most basic landfills, although new efforts are being made to recycle these items. In general, when Japanese talk about the ever-increasing mountain of garbage, they mean the increase in household trash, which often includes that of small businesses and commercial enterprises that contract for disposal with municipal waste treatment facilities. Industrial waste disposal is also a problem, perhaps a more insidious one.

Reduce, Reuse, Recycle - Perhaps nowhere does the past conservatism of the Japanese life-style contrast as greatly with its current affluence as in the approach to household and commercial (as opposed to industrial) waste. Although Japan's per capita generation of 1.04 kilograms (2.3 pounds) of garbage a day -- based on FY 1987 figures -- is lower than that of the United States (see JEI Report No. 1A, January 5, 1990), the growth rate is such that authorities are predicting landfills in major cities will be full in two to four years. The issue has been called one of the most urgent facing Japan, particularly as urban populations turn to more and more disposable packaging and generate more and more faxes, computer memos and other one-time-use paper.

Times have changed from the days when few resources could be wasted in resource-poor Japan and independent collectors went door-to-door and exchanged toilet paper for old newspapers or other recyclable materials. An economically strong Japan is able to buy its resources from abroad. At the same time space limitations discourage the separation of aluminum cans, glass bottles and other recyclable materials. However, households still are encouraged to separate their valuable discards for pick up by neighborhood associations or independent recyclers. Collection services specify on which days they will pick up combustibles, incombustibles and bulk items. Local governments determine to what extent garbage should be separated by households.

Since recycling has some connection to space being available, success varies across the country. (See Table 3 for the recycling rates of various materials.) In Numazu, a town with 210,000 people in Shizuoka prefecture, reportedly more than half the cast-offs are recycled. Tokyo's 12 million residents appear less inspired, judging by records that show paper products routinely comprising about 45 percent of the trash collected by the municipal government.[6] Given the high price of land in Tokyo, it is somewhat surprising that all but one of Tokyo's 23 wards has a recycling center -- the central-city ward of Chiyoda being the exception.

The government has attempted pilot projects to encourage recycling centers, even incorporating them with incineration plants in some cases. In addition to collecting and separating reusable cast-offs, the projects engage in public awareness campaigns to minimize waste by Japanese society. For example, several of the pilot plants resurrect usable trash, such as pianos, that are then put in display rooms for viewing by those touring the facilities.

Although government and business have taken steps in-house to encourage recycling of waste paper or less gift wrapping in this presentation-conscious society, the waste management system in Japan does not put a premium on reduction. Even though Tokyo government officials have begun to seek dumping sites

[6]Tokyo no Gomi Ni, Ima Kodo wo ("Let's Have Action on Tokyo's Garbage") (Tokyo: Tokyo-to Seisokyoku, 1990).

Table 3: Recycling Rates of Various Waste Resources in Japan, FY 1982-FY 1988

(in thousands of metric tons and percentage of total production)

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Waste Paper	8,357.6 (48.1%)	8,995.8 (49.1%)	9,636.5 (50.5%)	10,150.8 (50.2%)	10,510.5 (50.0%)	11,197.8 (49.6%)	11,957.1 (48.0%)
Aluminum Cans	16.0 (39.4%)	18.3 (40.2%)	21.8 (40.6%)	24.6 (40.6%)	28.8 (41.2%)	45.5 (41.5%)	62.2 (41.7%)
Steel Cans	385.7 (39.5%)	389.0 (39.9%)	341.0 (33.2%)	409.0 (37.9%)	428.0 (37.2%)	460.0 (37.1%)	509.0 (40.2%)
Glass Bottles	0.87 (42.0%)	0.95 (41.3%)	1.0 (42.4%)	1.1 (47.2%)	1.2 (55.2%)	1.2 (54.4%)	1.1 (49.2%)

Sources: Paper Recycling Promotion Center, Aluminum Can Recycling Association, Japan Used-Can Treatment Association and Federation of Glass Bottle Recycling

elsewhere in the country, garbage collection in the municipality is free to homeowners provided they keep the average daily weight below 10 kilograms (22 pounds). The charge for each kilogram (2.2 pounds) above that amount is Y22.5 ($0.17); a once-a-week collection of bulky items can be requested for which the homeowner pays only Y22.5 for each kilogram over 200 kilograms (440 pounds).

Although commercial enterprises are expected to handle their own waste -- usually by paying independent collection agencies -- the trash of small businesses, especially in areas where houses and shops mix, often is indecipherable from household garbage. ". . . [T]his pushes the amount of garbage collected to a level exceeding the incinerating capacity," according to Sukehiro Goto, the director of the Social Environment System at the National Institute for Environmental Studies. "As a result, unburnt garbage has to be dumped at reclamation sites. This in turn has drastically shortened the period the reclamation sites can meet the needs as dumping grounds from the originally planned five years."[7]

As Mr. Goto indicated, Japan's much-used incinerators, which eventually handle almost 73 percent of the country's waste (see Table 4), are swamped under the amount of garbage being produced in Japan. Land, not cheap nearest the cities where incinerators most commonly are used (see Table 5), is only part of the cost. Wary of the increased traffic from garbage trucks in the neighborhood and perhaps concerned about the facility's ability to eliminate or minimize noxious fumes, citizens hold out for extras. A common inducement is a promise to use heat generated by the incinerator to supply hot water to nearby housing or recreational complexes.

[7]"Cities Doomed To Drown in Garbage? A Talk Between Katsumi Yorimoto and Sukehiro Goto," Pacific Friend, XVIII, No. 10, p. 16.

Table 4: Municipal Waste Disposal by Treatment Category, FY 1987

(in metric tons per day)

	Total Disposed	Landfill	Treatment: Interim Treatment	Incinerator Facilities	High-Speed Composting	Composting and Feed	Other
Waste	100,530	15,377	n.a.	81,011	124	6	4,011
Bulky Waste	3,743	1,242	1,926	419	--	--	156
Direct Disposal	18,489	11,532	n.a.	6,672	6	6	272
Private Disposal	4,194	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total Handled	126,956	45,044*	1,926	89,117**	131	13	4,729

*Landfill totals include 28,151 tons a day in direct disposal plus 16,893 tons in processed refuse. This includes 14,500 tons from incinerators, 14 tons from high-speed composting facilities, 621 tons from bulk waste interim treatment facilities and 1,760 tons from unidentified "other" sources.
**Incineration facilities receive 1,015 tons from the interim treatment facilities for bulk waste.

Source: Clean Japan Center and Ministry of Health and Welfare

Table 5: Solid Waste Disposal Systems by Population Area, FY 1986

(in percent)

	11 Largest	300,000-500,000	100,000-200,000	Less Than 50,000	Towns/Villages
Incineration	82.7%	76.1%	51.3%	40.8%	32.2%
Landfill	16.1	20.5	31.3	48.4	53.3
Resource Recovery and Other	1.2	3.4	17.4	10.8	14.6

Source: Ministry of Health and Welfare

Dross to Gold - While neither recycling nor incineration is adequate to counterbalance consumption in Japan, some bright spots exist in the ways technology is used to create energy or reshape resources. By FY 1983 at least 30 percent of the incineration plants used waste heat recovery boilers. Figures from the Health and Welfare Ministry show that Japan had 1,893 incinerators in FY 1987, of which 639 were continuous combustion type; the remainder were batch combustion.

Although at one time there were limits on transfers of generated electricity, the oil shocks of the 1970s ushered in a new era of cooperation. The excess electricity generated at one Tokyo waste facility last year, for example, was sold to Tokyo Electric Power Co., Inc. at prices ranging from Y4.5

($0.033) per kilowatt-hour during nonsummer months to Y7.5 ($0.056) per kilowatt-hour during the summer. The total for the year earned the facility about Y1.4 billion ($10.4 million).[8] Monitors at the municipally run waste plant operate continuously to show when it needs to buy electricity or when it has excess electricity that can be sold under contract to Tepco.

Other areas where technology eases the burden created by mountains of waste are in the creation of usable material from incineration ash or even the sludge left from treated sewage. Fertilizer, a familiar byproduct of composting or phosphorous-rich ash, is a less common use in modern Japan than construction materials, including cement as well as road and backfill components. A publication of the Clean Japan Center, a government and corporate-sponsored coordinator of recycling information, noted that a FY 1987 survey of industrial waste recycling found 1.2 percent of "combustion residue" being used for fertilizer, while 30 percent went into cement and concrete products and 12.6 percent to such civil engineering uses as road and backfill materials. Some of the incinerated municipal waste also gets "recycled" into such products. Thus, the Clean Japan Center differentiates between the approximately 36 percent of municipal waste that goes to a landfill and the remainder that is reduced through treatment (usually incineration) and recycled.[9]

Problems of Loose Controls - While municipal governments have scrambled to cope with a growing deluge of household and commercially generated garbage, the burden of industrial waste management has rested primarily on manufacturers. Although various regulations dictate where certain types of hazardous or nontoxic waste can be dumped, oversight has been a problem.

A Ministry of Health and Welfare survey from FY 1985, the latest available data, noted that industries recycled about 41 percent of the 312 million metric tons of waste they generated that year; about 136 million metric tons were treated and reduced, of which 25 million metric tons then were sent for recycling along with an estimated 104 million metric tons that were recycled directly. The rest, plus 72 million metric tons carted off without treatment, went directly to a dumping area. The category sent for disposal is of primary concern to regulatory officials, who are finding an increasing amount of waste that has been dumped illegally.

While manufacturers can consign disposal to one of the 56,538 firms licensed to handle industrial waste as of April 1987, they remain theoretically responsible for the ultimate proper disposal. A Japan Times editorial last year noted, "[T]he problem is that not a few smaller operators have been found to have illegally dumped industrial wastes in remote areas, posing a serious environmental problem to local residents."[10] The National Police Agency estimated at yearend 1990 that nearly 1.7 million metric tons of industrial material had been dumped illegally in the preceding 11 months, a figure almost twice

[8]Interview with Minoru Iida, head of the Oi Waste Treatment Plant, Tokyo Metropolitan Government, January 18, 1991.

[9]Clean Japan Center, Japanese Waste Management and Minimization (no date).

[10]"The waste problem worsens," Japan Times, February 2, 1990, p. 18.

the 1989 estimate of 870,000 metric tons. A majority of the illegal dumping involves construction materials. Some has involved improper disposal of medical wastes, which led the Ministry of Health and Welfare to draft guidelines in 1989 urging medical care and waste facilities to seek proper disposal methods.

In an indication of the difficulty of following the industrial waste trail the Police Agency pointed out that gangsters were involved in 11 of the 240 cases investigated in 1990. Of the 199 cases determined to have involved illegal dumping, 53 arrests were made, although the reports did not make clear whether the arrests were of the intermediary's or the corporation's officers. The Health and Welfare Ministry further acted last year to track industrial wastes through a "Manifest System," designed to require the discharging source to describe the form of waste and provide a manifest to determine the route and final treatment of the waste.

Another growing concern is that more industries may begin to look overseas for disposal of their wastes, particularly the hazardous variety. Japan has not yet signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, a United Nations-sponsored treaty that is to go into effect this summer. However, a bill drafted by MITI is said to follow the intent of the treaty, which requires waste-accepting nations to approve the imports. The MITI bill also says waste exports would be allowed only if domestic handling would be difficult or if the products are to be recycled in the recipient nation. Approximately 45 toxic substances would require government approval for export; the ministry further hopes to expand domestic regulations to include the same 45 substances since less than 20 are regulated now.

Inattention and Infrastructure

Like most industrialized countries, Japan moved toward building up its economy often without thought to environmental harm, at least until various pollution crises caused alarms to ring in the late 1960s. While the compensation law and various regulations helped address immediate environmental health problems in the 1970s, growing affluence and urbanization outpaced government's oversight and highlighted areas where environmental, and possibly health, problems could arise because of the lack of well-developed sewerage and water treatment systems as well as other related types of public infrastructure.

Problems of Infrastructure - Slow improvements in surface water quality (see Table 6) and the increase in underground water pollution have led to various amendments aimed at strengthening the 1970 Water Pollution Control Law. But dual efforts brought about by health standards for drinking water supplies and technological advances in filtration and chemical treatment, which help improve safety as well as palatability, are in danger of being overwhelmed by increased strains on the water system from urban population concentrations. Particular blame for water pollution has been laid at the household door. A June 1990 amendment to the Water Pollution Control Law noted that household wastewater made up the majority of the organic water pollution in lakes, rivers and semi-enclosed bodies of waters. Household effluent was said to be responsible for 70 percent of the organic water pollution in Tokyo Bay, for example.

Prefectural governments have primary jurisdiction over water pollution problems; they have the authority to inspect for violations and impose penalties where appropriate. All the prefectures have instituted stricter standards

Table 6: Water Quality Compliance in Japan per Body of Water, FY 1979-FY 1988*

	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Coastal Waters	78.2%	79.8%	81.6%	81.%3	79.8%	81.3%	80.0%	81.2%	82.6%	82.7%
Rivers	65.0	67.2	63.3	65.3	65.9	63.4	67.7	68.6	68.3	73.0
Lakes, Reservoirs	41.8	41.6	42.7	41.7	40.8	42.7	41.2	40.0	43.1	43.3

*Based on the number of bodies of water to which environmental quality standards for the living environment are applied; these standards are distinct from health standards, which are applied to all bodies of water and limit toxic substances, such as cadmium, alkyl mercury, cyanide, organic phosphorus, lead, arsenic, chromium VI and PCBs. Environmental quality standards vary, depending on uses and body of water. Coastal waters must meet pH, chemical oxygen demand, coliform count and dissolved oxygen limits. Lakes and reservoirs are assessed for biochemical oxygen demand, dissolved oxygen and coliform count plus nitrogen and phosphorus. Rivers must meet the above plus limits on suspended solids.

Source: Environment Agency

than those imposed by the central government. In one area, though, the central government remains a key player: assistance with construction of sewerage systems. Subsidy rates vary according to location and whether the project is to build a treatment plant or trunk lines. Tokyo, for example, which began a concerted effort in the 1970s to extend sewer lines throughout the city (see Table 7), receives less help from the central government than do other areas. Subsidies, including grants, from the central government cover about half of

Table 7: Tokyo Municipal Government's Expenditures on Sewer Construction, FY 1965-FY 1986

(in billions of yen and percent of covered population)

Year	Outlay	Percent	Year	Outlay	Percent
FY 1965	Y23.0	35%	FY 1976	Y169.9	65%
FY 1966	26.7	39	FY 1977	183.9	68
FY 1967	33.9	42	FY 1978	200.8	70
FY 1968	38.5	45	FY 1979	240.3	72
FY 1969	39.3	48	FY 1980	221.1	74
FY 1970	49.6	48	FY 1981	225.7	76
FY 1971	80.5	52	FY 1982	240.3	78
FY 1972	113.2	55	FY 1983	224.9	80
FY 1973	119.5	58	FY 1984	221.2	82
FY 1974	153.4	60	FY 1985	235.3	83
FY 1975	158.4	63	FY 1986	247.6	85

Source: Tokyo Metropolitan Government, Sewerage in Tokyo, 1988.

project construction costs in Tokyo but approximately 75 percent of the overall costs in areas that have less infrastructure.[11]

Inadequate sewerage systems often are cited as one of the deficits in Japan's standard of living since only about 60 percent of the population in FY 1987 had some type of flush-toilet system (see Table 8). This figure includes septic systems (known as joukasou), which accounted for about 46 percent of the flush systems. Elsewhere in Japan services using vacuum hookups are hired to collect raw sewage, which they deposit in landfills or drying beds or even dump into storm sewer systems with little or no treatment. The 1990 water pollution control amendment specifically urged the public to treat waste cooking oil and

Table 8: Facilities in Planned Treatment Areas for Raw Sewage, FY 1975-FY 1987*

A: Number of Flush Toilet Systems

(in thousands)

	Public Sewer Systems	Purification/ Septic Tanks	Total	Share Served**
FY 1975	18,832	17,532	36,364	32.6%
FY 1980	26,324	26,867	53,191	45.5
FY 1985	35,542	32,323	67,865	56.0
FY 1987	39,801	33,536	73,337	60.1

B: Volume of Sewage in Nonflush Systems***

(in kiloliters per day)

	Planned Collection				
	Raw Treatment	Manhole Dumping	Farm Use	Ocean Dumping	Private Treatment
FY 1975	67,384	5,753	3,559	13,263	16,934
FY 1980	76,770	6,658	2,497	13,158	12,063
FY 1985	79,269	4,967	1,875	10,151	8,350
FY 1987	80,776	4,249	1,529	9,688	6,589

*Planned treatment areas accounted for 99.3 percent of the population in 1975, 99.6 percent of the population in 1980, 99.8 percent of the population in 1985 and 99.9 percent of the population in 1987.

**Percent of facilities in planned treatments areas served by flush toilet systems.

***Raw sewage volume is estimated by dividing total annual volume by 365.

Source: Ministry of Health and Welfare, Water Supply and Environmental Sanitation Department

[11]Tokyo Metropolitan Government, Sewerage in Tokyo (Tokyo: Sewerage Bureau, March 1988).

handle detergents economically to alleviate the pollution going into public water bodies.

The lack of sewage treatment systems played into the hands of U.S. negotiators at the 1989-90 Structural Impediments Initiative talks. They hoped Japan would increase funding for public infrastructure in an attempt to address a major, underlying cause of the bilateral trade deficit -- the gap between savings and investment in Japan. As a result of their promise to spend Y430 trillion ($3.2 trillion) on public works over the next 10 years, Japanese policymakers drafted a FY 1991-FY 1995 public works plan that calls for Y2.8 billion ($21 million) for sewage treatment facilities (see JEI Report No. 1B, January 11, 1991).

The influx of people into cities has had another spin-off: increased use of underground structures to accommodate transportation, housing and shopping facilities. This construction, in turn, has resulted in underground water being pumped out, which has caused subsidence problems. Another concern about increased construction is that it prevents natural seepage and encourages the artificial channeling of rainwater and other runoff, which often ends up being untreated until needed for drinking water.

Disrupted Water Supplies - The Health and Welfare Ministry moved in 1989 to expand its attack on toxic substances that threaten the safety of drinking water by adding trichloroethylene and tetrachloroethylene to the list of harmful substances regulated by the 1970 Water Pollution Control Law. Recent surveys of groundwater throughout Japan indicated that three harmful substances -- trichloroethylene, tetrachloroethylene and a form of trichloroethane -- were showing up in greater-than-recommended quantities. In one survey tetrachloroethylene, in fact, surpassed recommended levels in 11.8 percent of the tested wells. Almost all of these, 11.6 percent, were used for drinking water.

Although not the main source of drinking water in Japan, subterranean water nevertheless supplies about 22 percent of the country's drinking water needs (see Table 9). In some places wells may be the only source of water, making preservation of groundwater of paramount interest. The attitudes shown by the Environment Agency's 1989 annual report and MHW's similar report that same year underscored different perceptions about pollution prevention and the development of alternatives. The Environment Agency stated, "It is clear that measures must be taken to prevent pollution before it develops much, since groundwater, once polluted cannot be restored easily." The Health and Welfare Ministry suggested, ". . . over recent years there has been a deterioration in the hygienic condition of wells due to the pollution of underground water, so that there is now the problem of how to supply areas which are no longer provided for."

No Overriding Ethic

The lack of an overarching approach to environmental regulation in Japan can be seen from various bureaucracies sharing joint responsibilities but advocating goals that might be at odds. The Ministry of Construction, for example, has authorized a dam on the Nagara River for flood control, among other reasons. Last year the then Environment Agency chief urged further environmental impact assessments, questioning along with opponents of the dam whether adequate attention had been paid to the impact the dam could have on various rare

Table 9: Water Consumption in Japan by Use and Source*

(consumption in billion cubic meters annually)

	Consumption	Surface Water	Ground Water**
Industry	10.33	7.24	3.09
Tap and Drinking Water	14.93	11.61	3.32
Agriculture	57.0	53.25	3.75
Buildings and Other	n.a.	n.a.	1.16

*Based on surveys taken in 1986 for tap water and industrial statistics. Data for agricultural land assessed from 1973 surveys by the Ministry of Agriculture, Forestry and Fisheries. The use of water for businesses and other buildings was determined by Environment Agency surveys from 1971 to 1987.
**Includes wells and springs.

Notes: Industry as defined by the Ministry of International Trade and Industry and calculated as operating 300 days a year.
Tap water also is supplied to industries, causing an overlap of end-use figures of about 690 million cubic meters a year.

Source: Environment Agency

fish and water quality. The current head of the Environment Agency has backed away from the issue, reportedly telling the press, "This is not within the jurisdiction of the Environment Agency." A similar comment from the head of this country's Environmental Protection Agency would be unusual, given EPA's ability to challenge the environmental soundness of federal projects under the National Environmental Protection Act.

Another problem of shared responsibilities is that bureaucratic turf wars can slow the drafting of regulations aimed at counteracting pollution problems. A good example is the dispute over whether to revise the current solid waste management statutes, the position advocated by MHW, or craft new legislation, the approach favored by MITI and the Environment Agency.

A Question of Recycling Old Lessons

Japan has responded to pollution problems in a variety of ways. Like most industrialized countries, reaction rather than foresight has been the rule. That concept, however, ignores fortuitous regulations that may have averted or alleviated unknown dangers.

The 1973 compensation law raised hopes among environmental activists of holding polluting companies responsible for their actions. While the statute established a polluter-pays precedent, subsequent revisions may have created some hesitation for assigning blame without a preponderance of scientific evidence. Nevertheless, the law continues to connect companies, through levies on emissions, to broader efforts to improve the downwind and downstream environment. Japan's strict air quality standards, partly resulting from attention to health concerns associated with passage of the 1973 compensation law, positions

the country to combat some of the gases thought to cause global warming, especially sulfur dioxide and nitrogen dioxide. Success in monitoring these two gases hints at the possibility of also monitoring emissions of carbon dioxide, another gas held responsible by many scientists for global warming.

One of the problems with the compensation law, however, has been the drawn-out process of trying to qualify for the measure's benefits. Another problem with future use of this law and similar attempts to pinpoint blame for health-damaging pollution is that those who try to seek redress often are considered rabble-rousers in a society fond of noting that the nail that sticks out gets hammered. The compensation law has proved to be effective but at some expense to both individual sufferers and society.

Another effective Japanese way of handling pollution matters also has had its downside. Government-corporate cooperation has been handy whenever one ministry has had the ability to exercise firm "guidance," for example in adjusting air pollution emissions. But the strong ties between various ministries and industries also can complicate application of an overall environmental ethic, similar to the review of economic and environmental factors required by America's National Environmental Protection Act.

One of Japan's pollution control lessons, the effectiveness of technology, has been singularly successful on a variety of fronts, ranging from diminishing pollution at the source to reshaping treated waste into a new, recycled product. But even technology is no deus ex machina when urbanization and affluence put more demands on a system than it is capable of handling. Particularly in relation to problems tied to insufficient public infrastructure, Japan may be learning the drawbacks of not addressing some problems earlier. The latecomer syndrome, which helped Japan capitalize on the technological achievements of others as it drove to greater economic success, also has a downside.

Appropriate application of Japan's past lessons in pollution control to other countries, especially those in the Third World, would entail cautions about not relying too much on technology as well as recommendations for a strong working relationship between industry and government, tempered by an ethic that balances economic advantages with necessary health and environmental considerations. These are lessons not only for developing countries but for future contingencies in Japan, as well.

For further information, contact Pat Murdo.

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The views expressed in this report are those of the author and do not necessarily represent those of the Japan Economic Institute.

NOTE

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